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1930/31

Bulletin of the University of New Hampshire

Graduate School Number



Vol. XXI, No. 8 Durham, N. H. April, 1930

University of New Hampshire
Library

BULLETIN OF THE
UNIVERSITY OF NEW HAMPSHIRE

Entered as second-class matter, August 5, 1907, at
the post-office at Durham, N. H., under the Act of
Congress of July 16, 1894.

The Bulletin is published in September, October,
November, December, January, February, March and
April, and includes:

The Catalog of the University
The Report of the President
The Financial Report
The Catalog of the Summer School
The Illustrated Booklet
The Catalog of the Graduate School

and other publications of the University.

UNIVERSITY CALENDAR

1930-1931

SUMMER SESSION

June 30	Monday	Registration Day
July 1	Tuesday	Classes begin at 8 A.M.
Aug. 8	Friday	Summer Session Closes at 4 P.M.

FALL TERM

1930

Sept. 16	Tuesday	Matriculation Day—Freshman Class
Sept. 22	Monday	Registration Day—All Classes
Sept. 23	Tuesday	Recitations begin at 8 A.M.
Sept. 24	Wednesday	University Day—Afternoon holiday
Oct. 17	Friday	Annual Meeting of Board of Trustees
Oct. 25	Saturday	Home-coming Day
Oct. 30	Thursday	Mid-Term warnings to be filed, 5 P.M.
Nov. 8	Saturday	Dads' Day
Nov. 26	Wednesday	Thanksgiving recess — Wed., 12.30 P.M., to Fri., 8 A.M.
Dec. 8-12	Mon.-Fri.	Fall Term examinations
Dec. 12	Friday	Fall Term closes at 4 P.M.

WINTER TERM

1931

Jan. 5	Monday	Registration Day
Jan. 6	Tuesday	Classes begin at 8 A.M.
Jan. 16	Friday	Meeting of Board of Trustees
Feb. 10	Tuesday	Mid-Term warnings to be filed, 5 P.M.
Feb. —	Fri., Sat.	Winter Carnival, Fri., 12.30 P.M. to Sat., 12.30 P.M.
Mar. 10	Tuesday	Town Meeting
Mar. 16-20	Mon.-Fri.	Winter Term examinations
Mar. 20	Friday	Winter Term closes at 4 P.M.

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SPRING TERM

1931

Mar. 30	Monday	Registration Day
Mar. 31	Tuesday	Recitations begin at 8 A.M.
Apr. 17	Friday	Meeting of Board of Trustees
May 5	Tuesday	Mid-Term warnings to be filed, 5 P.M.
May 2	Saturday	Mothers' Day
May —	Fri., Sat.	Military Manoeuvres
May 30	Saturday	Memorial Day—Holiday
June 8-12	Mon.-Fri.	Spring Term examinations
June 10	Wednesday	Senior examinations close at 4 P.M.
June 13	Saturday	Class Day—Alumni Day—Meeting of Board of Trustees
June 14	Sunday	Baccalaureate Day
June 15	Monday	Commencement Day

BOARD OF TRUSTEES

HIS EXCELLENCY, GOVERNOR CHARLES W. TOBEY, LL.D., <i>ex officio</i>	
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DWIGHT HALL, A.B., <i>President</i>	Dover
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June 14, 1916 to June 30, 1933	
ELIZABETH C. SAWYER	Dover
July 12, 1925 to June 30, 1934	
*ALBERT H. BROWN, B.S., <i>Secretary</i>	Strafford
September 1, 1925 to June 30, 1932	
HARRY D. SAWYER	Woodstock
September 15, 1926 to June 30, 1930	
JAMES A. WELLMAN, B.S.	Manchester
January 26, 1928 to June 30, 1931	
ROBERT T. KINGSBURY	Keene
January 27, 1928 to June 30, 1932	
JOHN W. PEARSON, A.B.	Concord
January 26, 1928 to June 30, 1932	
ALBERTUS T. DUDLEY, A.B.	Exeter
June 14, 1928 to June 30, 1933	
*CHARLES H. HOOD, D.SC.	Charlestown, Mass.
May 6, 1929 to June 30, 1931	

*Elected by Alumni.

UNIVERSITY OF NEW HAMPSHIRE

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CLAUDE T. LLOYD, PH.D., *English*
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JOHN A. FLOYD, A.B., *Languages*

GRADUATE STUDY AND ADVANCED DEGREES

AIMS

The Graduate School aims to meet the needs of *superior students* who are preparing to become teachers in colleges or universities, or investigators, and to offer opportunities to qualified students for a more advanced training than that which they may obtain in an undergraduate course.

ADMINISTRATION

Graduate work is offered, under the supervision of the Dean of the Graduate School, by competent members of various departments of instruction and research. These members constitute the Faculty of the Graduate School.

The general administrative functions of the Faculty are delegated to the Dean and the Council.

ADMISSION

A student who holds a bachelor's degree, or its equivalent, from an approved college or university, may be admitted to graduate study. In general a student must have credit in not less than 90 time units, or the equivalent, in the department in which he wishes to be admitted to major.

Admission to graduate study does not necessarily imply admission to candidacy for an advanced degree. Students who are not planning to become candidates for an advanced degree may be admitted to graduate study upon the recommendation of the heads of the departments concerned, and with the approval of the Dean of the Graduate School.

A student may major only in the departments represented in the catalog of the Graduate School. However, a graduate student may be admitted to graduate study in departments not represented in the Graduate School catalog upon recommendation of the departments concerned and with the approval of the Graduate Council.

GRADUATE SCHOOL

TUITION AND FEES

Tuition is \$150 for residents of New Hampshire and \$250 for non-residents. For non-resident students who entered the University before the end of the college year 1927-28, the tuition is \$225. Tuition is paid in advance in three equal installments, one on the first day of each term.

A diploma fee of \$5 is charged upon graduation. Charges will be assessed for extraordinary breakage or damage. No laboratory or course fees are charged. Payment of the tuition fee entitles the student to admission to all varsity athletic games and contests.

Members of the regular college staff (and their immediate families) registered for 30 or more time units shall be granted scholarships. A scholarship will reduce the tuition charge to \$25 per term. Members of the regular college staff and their immediate families registering for less than 30 time units will be required to pay \$.50 for each time unit.

HONORARY FELLOWSHIPS FOR VISITING SCHOLARS

Professors or other eminent scholars who may desire temporarily the privileges of the library and the research facilities of the University, and who are not candidates for a degree, may, upon recommendation of the Dean of the Graduate School and the approval of the President of the University, be appointed honorary fellows without stipend. Honorary Fellows shall not be required to pay any charges except, possibly, the cost of unusually expensive supplies or equipment.

ASSISTANTSHIPS AND SCHOLARSHIPS

Graduate assistantships which usually require half-time service at a stated salary are available in a number of departments. Graduate assistants pay tuition in accordance with the regulation pertaining to the members of the college staff. The residence requirement for a Master's degree for holders of these appointments is not less than two years.

A limited number of superior students are awarded exemption from tuition. These awards are subject to the maintenance of a high scholarship record in the Graduate School and may be

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revoked by the "Committee on Exemption of Tuition" at the end of any term, if, in their judgment, the student does not merit such exemption for the subsequent terms.

Inquiries regarding these assistantships and scholarships should be addressed to the head of the department concerned.

SUPPLIES

Books, drawing instruments, materials, etc., may be purchased at the University bookstore in Thompson Hall.

ROOMS

The University has four dormitories for women and five for men. All rooms are heated, lighted and furnished. Bed linen, quilts, and towels, however, are provided by the individual student. Each women's dormitory is equipped with a laundry. In many cases three students occupy a suite of rooms. Prices range from \$63 to \$120 a year for each student. Applications for rooms in the dormitories should be addressed to the Registrar, University of New Hampshire, Durham, N. H.

A deposit of \$5 must accompany each application for a room, this deposit to be forfeited if the room accepted is not occupied by the applicant. The deposit is held as a guarantee against breakage, and will be returned upon the payment of any bills for damage at the close of the year, or upon the applicant's withdrawal from the University.

Reservation for rooms will be cancelled ten days before the registration date noted in the current college catalog, unless one-third of the annual rent has been paid before that date.

Rooms paid for and not accepted one day after registration will be declared vacant and the room rent returned, unless the individual having the reservation makes a written request to the Registrar to hold the room until a later date. The advance payment of the room deposit will not be returned to those making this special request. No rooms will be reserved more than ten days after the registration date. Early application is necessary in order to secure a choice of rooms. Rooms may be secured in private houses for about the same prices as for those in college dormitories.

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Women students, unless living at home, are required to room in the women's dormitories, or in approved houses. A competent matron is in charge of each women's dormitory.

BOARD

The University operates on a self-service basis a modern, well-appointed Commons. Both regular weekly board and cafeteria service are provided. Exact cost records are kept, and prices are adjusted in such a manner as to give students the advantage of changing costs.

REGISTRATION

A student desiring to register for graduate study must submit to the Dean of the Graduate School the official application for admission to graduate study. Blanks for this purpose may be obtained from the Dean's Office.

Upon admission to graduate study, a student first pays his fee at the Business Office and then deposits his enrollment cards with the Registrar.

REQUIREMENTS FOR GRADUATE CREDIT

Graduate credit will not be allowed to undergraduate students unless such credit has been approved in advance by the Dean of the Graduate School.

A graduate student taking a subject for graduate credit which is not primarily for graduates shall be required to do additional work beyond that required of undergraduates who are taking the same subject.

Graduate credit may be given for subjects not listed in the Graduate School catalog if such credit is recommended by the major and minor departments concerned, and approved by the Dean of the Graduate School.

A student will not receive graduate credit for a subject in which he has obtained a grade lower than 70.

ADVANCED DEGREES

Two types of advanced degrees are conferred: (a) Master of Science and Master of Arts in the respective "major" sub-

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jects, given only in course, and (b) the professional degrees, Mechanical Engineer and Electrical Engineer, conferred only upon graduates of this institution, and based upon the quality of their professional work and the presentation of a satisfactory thesis. Information in regard to the professional degrees may be obtained from the Dean of the College of Technology.

REQUIREMENTS FOR THE MASTER'S DEGREE

Residence.—A minimum of one full academic year, or four summer sessions, in residence is required.

Credits.—An average grade of at least 80 in not less than 150 time units is required, of which not less than 80 or more than 100 time units shall be devoted to the major subject (including the thesis), and not less than 30 or more than 50 time units shall be devoted to the minor subjects. Work in allied departments will be accepted for credit provided such work is properly correlated with the major subject. Not over 50 time units may be given for a thesis. Of the total time units required for an advanced degree, not more than half will be allowed a candidate on admission from another institution. Credits for the thesis shall be recorded in the registrar's office as "Thesis Credits."

Candidacy.—At least six months previous to the time the degree is sought, an application for admittance to candidacy must be submitted to the Council for its approval; and if a thesis is required, the candidate must file with the Council, for its approval, a brief outline of the thesis project as recommended by the head of the department in which the thesis work is being done.

Examinations.—All candidates must meet the regular departmental requirements as to examinations in the subjects for which they are registered and the requirement of a special comprehensive examination, by the heads of the departments in which the major and minor subjects have been taken, at any time designated by the departments concerned. In addition, the candidate must pass an oral examination by a special committee designated by the Council and including the heads of the

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departments in which the major and minor subjects have been taken before the candidate may be recommended for the Master's degree.

Thesis.—All theses must be typewritten upon standard paper, eight and one-half by eleven inches, medium weight, neatly bound in a black cloth cover, gilt-lettered on the outside cover with the title, name of author, degree sought, and year of graduation. The title page should bear the following statement: "A thesis submitted to the University of New Hampshire in partial fulfillment of the requirements for the degree of Master of Arts (Master of Science) in (name of "major" subject).

Whenever a thesis is printed in any periodical, it must be designated as having been accepted as a Master's thesis by the University of New Hampshire.

Two bound copies must be filed before Commencement Day, one with the Librarian and one with the head of the department in which the major work has been done. The copy filed with the Librarian must be the original, not a carbon copy.

DESCRIPTION OF SUBJECTS

AGRICULTURAL AND BIOLOGICAL CHEMISTRY

THOMAS G. PHILLIPS, *Professor*

STANLEY R. SHIMER, *Assistant Professor*

Students majoring in this department are expected to have had preparation in the biological sciences, in physics and in general, analytical and organic chemistry. Physical chemistry and a reading knowledge of German or French are desirable. The library and equipment of the Experiment Station are available for the use of graduate students.

SUBJECTS FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

4-a. Physiological Chemistry. An advanced study of the chemistry of the fats, carbohydrates and proteins, and some of the general applications of chemistry to biology, such as colloids and enzyme action.

Prerequisite: Agricultural Chemistry 2-b or 24-b or equivalent preparation in organic chemistry and quantitative analysis. Lec., 2 hrs.; lab., 5 hrs.; prep., 3 hrs.; 10 units.

5-b. Physiological Chemistry. The chemistry of animal physiology, including foods, digestion, metabolism and excretion.

Prerequisite: Agricultural Chemistry 4-a. Lec. 2 hrs.; lab., 5 hrs.; prep., 3 hrs.; 10 units.

6-b. Plant Chemistry. A study of the chemistry of plant growth and development, and methods for the analysis of plant materials.

Prerequisite: Agricultural Chemistry 4-a. Given only in alternate years beginning with 1930-31. Lec., 2 hrs.; lab., 5 hrs.; prep., 3 hrs.; 10 units.

7-a, 8-b, 9-c. Agricultural Analysis. A study of the methods of analysis of fertilizers, feeding-stuffs and other products important in Agriculture.

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Prerequisites: At least 15 units in Quantitative Analysis and 20 units in Organic Chemistry. Lab., 8 hrs.; prep., 2 hrs.; 10 units.

19-c. Dairy Chemistry. A study of the chemistry and methods of analysis of milk and other dairy products.

Prerequisite: Agricultural Chemistry 2-b or equivalent preparation in organic chemistry and quantitative analysis. Given only in alternate years beginning with 1930-31. Lec., 1 hr.; lab., 5 hrs.; prep., 2 hrs.; 8 units.

21-c. Physiological Chemistry. The qualitative and quantitative examination of blood and urine.

Prerequisite: Agricultural Chemistry 5-b. Lec. 2 hrs.; lab., 5 hrs.; prep., 3 hrs.; 10 units.

SUBJECTS PRIMARILY FOR GRADUATE STUDENTS

10-a, 11-b, 12-c. Advanced Biochemistry. The preparation, composition and analysis of proteins, carbohydrates and fats. Readings, discussions and laboratory work. 10 units each.

13-a, 14-b, 15-c. Special Problems. Conferences and library and laboratory work on such topics as enzymes, physico-chemical methods, and certain phases of plant or animal nutrition and metabolism. Subject matter and credits to be arranged.

16-a, 17-b, 18-c. Seminar. 3 units each.

BOTANY

O. R. BUTLER, *Professor*

MARIAN E. MILLS, *Assistant Professor*

STUART DUNN, *Instructor*

20-a. Morphology of the Algae. Study of the habits, structure, life histories and relationships of the various groups of the algae.

Lab., 6 hrs.; assigned reading, 2 hrs.; 8 units.
Given in alternate years with 24-a.

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21-b. Morphology of the Bryophytes. Study of the structures, life histories and relationships of the liverworts and mosses.

Lab., 6 hrs.; assigned reading, 2 hrs.; 8 units.

22-c. Morphology of Gymnosperms. Study of the structure, life histories, relationships and classification of gymnospermous plants.

Lab., 6 hrs.; assigned reading, 2 hrs.; 8 units.

Given in alternate years with 23-c.

23-c. Morphology of Angiosperms. Study of the structures, life histories and classification of the flowering plants.

Lab., 6 hrs.; assigned reading, 2 hrs.; 8 units.

Given in alternate years with 22-c.

24-a. Plant Ecology. A study of the external factors affecting the plants' economy, structure, duration of life and typographical distribution of species; plant communities, plant associations, and plant succession.

Prerequisite: Botany 25-c. Conferences, assigned reading and reports; 5 units. Given in alternate years with 20-a.

25-c. Systematic Botany. A study of the higher plants of our native flora. The student is required to prepare an herbarium of 90 plants.

Prerequisite: Botany 1-a, 2-b, 3-c. Conferences, field and laboratory work; 8 units.

26-a. Plant Histology. General morphology of the tissue systems; the primary tegumentary tissue; the fundamental tissue system, the vascular tissue system, development of secondary members, formation of secondary tissue.

Prerequisite: Botany 6-a. Lab., 8 hrs.; assigned reading, 2 hrs.; 10 units.

27-a. Plant Physiology. A study of imbibition, osmosis, absorption, conduction, transpiration, guttation and the effect of environmental factors upon these phenomena; water relations of plants.

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Prerequisite: Botany 5-c. Lab., 8 hrs.; assigned reading, 2 hrs.; 10 units.

28-b. Plant Physiology. A study of mineral nutrition, photosynthesis, physical and chemical properties of chlorophyll, effect of external and internal conditions on carbon dioxide assimilation, products of assimilation, photoperiodism.

Prerequisite: Botany 5-c. Lab., 8 hrs.; assigned reading, 2 hrs.; 10 units.

29-c. Plant Physiology. Digestion of carbohydrates and fats, hydrolysing enzymes, respiration, oxidising enzymes, intramolecular respiration, digestion of proteids, proteolytic enzymes, effect of external conditions on growth, paratonic and autonomous movements.

Prerequisite: Botany 5-c. Lab., 8 hrs.; assigned reading, 2 hrs.; 10 units.

30-a, -b, -c. Literature of Plant Physiology. Assigned reading of monographs and other important literature of plant physiology.

Prerequisite: Botany 5-c. Conferences and written reports. Credits to be arranged.

31-a, -b. Diseases of Fruits. The bacterial and fungous diseases of fruits, their symptoms, cause and prevention.

Prerequisite: Botany 13-b. Lab., 5 hrs.; assigned reading, 2 hrs.; 7 units. Given in alternate years with 32-a, -b.

32-a, -b. Diseases of Vegetables. The bacterial and fungous diseases of vegetables, their symptoms, cause and prevention.

Prerequisite: Botany 13-b. Lab., 5 hrs.; assigned reading, 2 hrs.; 7 units. Given in alternate years with 31-a, -b.

33-b. Fungicides. Preparation and use of fungicides and a study of their effect upon the higher plants and parasitic organisms.

Prerequisite: Botany 13-b. Lab., 6 hrs.; assigned reading, 2 hrs.; 8 units.

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34. Mycology. Morphology, physiology and classification of the Schizomycetes, Myxomycetes, and Phycomycetes.

Lab., 6 hrs.; assigned reading, 2 hrs.; 8 units.

35. Mycology. Morphology, physiology and classification of the Ascomycetes, Basidiomycetes and Fungi imperfecti.

Lab., 6 hrs.; assigned reading, 2 hrs.; 8 units.

CHEMISTRY

HAROLD A. IDDLES, *Professor*

HEMAN C. FOGG, *Assistant Professor*

LAWRENCE H. OPDYCKE, *Assistant Professor*

JAMES A. FUNKHOUSER, *Assistant Professor*

RICHARD H. KIMBALL, *Instructor*

ALBERT F. DAGGETT, *Instructor*

Graduate study in chemistry is open to those who have completed the chemistry course of either the College of Liberal Arts or the College of Technology, or some similar course of study. Excellent opportunities are offered for research in General and Analytical Chemistry, Organic Chemistry and Physical Chemistry.

SUBJECTS FOR ADVANCED UNDERGRADUATES AND GRADUATES

100-a, 101-b, 102-c. Advanced Inorganic Chemistry.

Prerequisite: A general course in inorganic chemistry and quantitative analysis. Lec. 2 hrs.; lab. 2½ hrs.; prep. 3 hrs.; 7½ units.

152-a, 153-b, 154-c. Advanced Organic Chemistry. A consideration of the more advanced theories of organic chemistry.

Prerequisite: 42-c or 48-c. Rec. 3 hrs.; prep. 4½ hrs.; 7½ units.

160-a, 161-b, 162-c. Physical Chemistry. Advanced study of chemical theory, covering vapor density, molecular weights, specific heat, diffusion of gases, solutions, ionization, catalysis, colloids, thermochemistry, equilibrium, the phase rule, etc.

Prerequisite: Chemistry 29-c, Math. 8-b, Physics 8-c. Rec. 3 hrs.; prep. 4½ hrs.; 7½ units.

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163-a, 164-b, 165-c. Physical Chemistry Laboratory.

Prerequisite or parallel: Physical Chemistry lectures. Lab. 5 hrs.; prep. 2 hrs.; 7 units.

SUBJECTS PRIMARILY FOR GRADUATE STUDENTS

200-a. History of Chemistry.

Prerequisite: Acceptable courses in organic and physical chemistry. Lec. 3 hrs.; prep. 4½ hrs.; 7½ units.

201-b, 202-c. Chemistry of the Rarer Elements and Rare Earths. An introduction to this field of chemistry.

Lec. 3 hrs.; lab. 2½ hrs.; prep. 4½ hrs.; 10 units.

206-a, 207-b, 208-c. Advanced Quantitative Analysis. The complete analysis of complex minerals, and other determinations presenting more than ordinary difficulties.

Lab. 7½ hrs.; 7½ units.

249-a. Organic Chemistry Laboratory: Preparations.

Advanced organic synthesis, involving special training in organic laboratory technique. Lab. 10 hrs.; 10 units.

250-b. Organic Chemistry Laboratory—Qualitative Analysis. The reactions and properties of organic compounds. Use of group reactions in the identification of organic substances.

Lab. 10 hrs.; 10 units.

251-c. Organic Chemistry Laboratory—Quantitative Analysis. The combustion for carbon and hydrogen, Dumas nitrogen, Kjeldahl nitrogen, estimation of halogens, of sulphur and of organic radicals. The work will include some micro determinations.

Lab. 10 hrs.; 10 units.

252-a. Organic Chemistry. The chemistry of the Heterocycles.

Lec. 2 hrs.; prep. 5½ hrs.; 7½ units.

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235-b. Organic Chemistry. Stereo chemistry.

Lec. 2 hrs.; prep. 5½ hrs.; 7½ units.

254-c. Organic Chemistry. Special topics and theories of organic chemistry.

Lec. 2 hrs.; prep. 5½ hrs.; 7½ units.

270-a, 271-b, 272-c. Seminar. Presentation and discussion of recent investigations in the field of Chemistry.

Lec. 1 hr.; prep. 1½ hrs.; 2½ units.

280-a, 281-b, 282-c. Research for the Master's Degree.

Credit arranged.

EDUCATION AND PSYCHOLOGY

JUSTIN O. WELLMAN, *Professor*

HARLAN M. BISBEE, *Associate Professor*

ADOLPH G. EKDAHL, *Associate Professor*

NAOMI M. G. EKDAHL, *Assistant Professor*

JOHN C. HERRING, *Instructor*

The objectives for graduate students in Education are a sound educational philosophy, expertness in research, and technical efficiency in administration and supervision.

Students whose undergraduate records or whose technical experiences are prognostic of success in attaining the above objectives will be admitted to graduate study in Education.

Candidates for a Master's degree must present, in addition to a Bachelor's degree, 50 time units in education from the following courses, or their equivalents: Education 21-a, 22-b, 23-c, 31-a, 32-b, 33-c, 38-a, 39-b, 40-c, 41-a-b-c, and 44-c. One year of successful teaching experience will be considered to be equivalent to Education 41-a-b-c.

Candidates will be counselled to project a year of work which will permit concentration in: (1) Educational Psychology, (2) Educational Philosophy, (3) Administration and Supervision, or (4) Teaching Technique.

31-a. Psychology of Childhood. An intensive study of the development of the mind from childhood to adolescence. A careful interpretation of the development of the individual's

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mental processes with a view to proper methods of education is given special attention. Lectures, problems, assigned readings and discussions. Prof. Ekdahl.

Accepted jointly with 33-c, and 40-c, for State Secondary Certificate. Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

32-b. Psychology of Adolescence. The purpose of this course is to give high school principals and teachers a deeper appreciation of the habitual and impulsive life of boys and girls in their teens. Topics: preadolescence; the physical and mental traits of high school pupils; individual differences among high school pupils and their implications; motor training, gymnastics, athletics, play, sport, and games as they function in the education of the youth; growth of social ideas; adaptation of school work to intellectual development; moral and religious training. Lectures, problems, assigned readings and discussions. Prof. Ekdahl.

Prerequisite: Education 31-a. Accepted jointly with 31-a and 40-c for a State Secondary Certificate. Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

33-c. Psychology of Learning. This course considers the nature of learning and retention, and their neural bases; learning curves, their uses and significance; forms of learning; motives to learning; factors and conditions affecting the rate and permanency of learning; problems relating to learning capacity; transfer of training, and means of effecting beneficial transfers; applications to practical school work, and to the training of persons requiring special treatment. Lectures, assigned readings and discussions. Prof. Ekdahl.

Prerequisite: Education 32-b. Accepted jointly with 31-a and 40-c, for the State Secondary Certificate. Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

35-a. Measurements and Statistics. This course deals with the principles, methods and application of various types of scales for measuring general mental ability and educational achievement. It includes a brief survey of statistical methods

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essential to an understanding of testing. Sufficient practice in giving tests is provided to give the student an appreciation of psychological methods of procedure. Prof. Ekdahl.

Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

36-b. The Measurement of Achievement. This course will furnish an opportunity to study the results of education as measured by evidences that children are learning. Some of the topics discussed are: school marks; the development of standard tests; the diagnostic and prognostic study of tests; the interpretation of the results of achievement tests; how to develop scales in various secondary school subjects; the effects of measurements on examinations, scholarship marks, methods, supervision, courses and the like. Lectures, assigned readings, problems, and discussions. Prof. Ekdahl.

Prerequisite: Education 35-a Lec. or rec., 3 hrs.;
prep., 7 hrs.; 10 units.

37-c. Measurement of Aptitudes and Mental Alertness. This course will concern itself with the problem of analyzing various types of intelligence. It deals with the chief facts of normal, mental, physiological, and anatomical development as a basis for differentiation in class-room procedure. Some attention will be given to the problem of adjustment among super-normal and sub-normal pupils. A technique of the administration of group and individual tests is studied and emphasis is laid upon performance tests. Lectures, assigned readings, problems, and discussions. Prof. Ekdahl.

Prerequisite: Education 36-b. Lec. or rec., 3 hrs.;
prep., 7 hrs.; 10 units.

38-a. Secondary Education in the Junior High School. The evolution of the junior high school; its particular features and functions; the attempt to humanize the education of adolescents and advance the cause of democracy are some of the topics discussed. Considerable attention is given to the program of studies for and administration of junior high schools. Consideration is given in this course to extra-classroom activities and their articulation with classroom procedures. Lectures,

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assigned readings, problems, discussions. Prof. Wellman and Prof. Bisbee.

Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

39-b. Secondary Education. Evolution of secondary schools, their articulation with elementary schools, colleges, technical institutes, vocations, and the home; teaching staff; curriculum; student organizations; life guidance; aims and values of the various high school subjects; extra-curricular activities. Lectures, assigned readings, problems and discussions. Prof. Wellman and Prof. Bisbee.

Accepted for State Secondary Certificate. Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

40-c. Class Room Methods. A consideration of the purposes of high school instruction; selection and arrangement of subject matter; types of learning involved in high school subjects; the place of practice or drill; the significance of reflective thinking and correct habit formation; the art of questioning; directed study; the measurement of the results of teaching. Lectures, assigned readings, problems and discussions. Prof. Wellman and Prof. Bisbee.

Prerequisite: Education 39-b. Accepted with 31-a and 32-b or 33-c for a State Secondary Certificate.

Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

40.4-a. The Teaching of History in Secondary Schools. Prof. Wellman.

40.7-b. The Teaching of Science in Secondary Schools. Prof. Wellman.

Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

42-a. History and Principles of Vocational Education. The historical development of vocational education. The psychological and sociological bases of vocational education; problems, institutions, methods, contemporary movements and legislation; applications of research in relating vocations and education. Lectures, assigned readings and discussions. Prof. Wellman.

Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

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43-b. Mental Hygiene. This course will consider some of the more important chapters in modern school hygiene: conditions that determine growth and development, physiological age, the physical and mental differences between children and adults, the general principles of somatic and mental hygiene, tests of ability to work and physical condition, medical inspection, the development of habits of healthful mental activity and the hygienic aspects of various school exercises. Lectures, assigned readings, cases and discussions. Prof. Ekdahl.

Prerequisite: Education 31-a. Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

44-b-c. New Hampshire State Program of Studies and School Law. This course will consider the aims and purposes, the plan of organization and administration of the secondary school as outlined in the New Hampshire State Program of Studies. This program of studies will be evaluated in the light of those used in other states and students will have an opportunity here to become thoroughly acquainted with the secondary school organization in New Hampshire. Similar emphasis will be placed on the New Hampshire School Law. Lectures, assigned readings, and discussions. Prof. Bisbee.

Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

45-a. School Administration. A subject in the fundamental principles of school administration intended primarily for superintendents, and for those who are preparing to become superintendents or supervisors, or directors of educational research. Topics: principles of scientific management applied to school administration; school records and reports; problems of school finance; judging school buildings; special schools; special phases of school work as health education, compulsory attendance; the training of school superintendents and supervisors; the uses of school surveys; the publicity work of a school system. Reference reports on special topics and discussions. Prof. Bisbee.

Open especially to men and women with teaching experience, or to those who have had several Education courses and wish to prepare themselves for

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supervisory positions. Admission by consent of the instructor. Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

46-b. High School Administration. The following topics will be covered: the legal status of the secondary high school; high school population; the problem of reorganization; the program of studies; vocational education and guidance in the high school; grading, measurement, classification, excess credit for quality; enrolling the student; social organization; community relationships; the high school library, staff, buildings, costs and efficiency, in general. Lectures, assigned readings and discussions. Prof. Bisbee.

Open especially to both men and women who wish to become principals or headmasters. Admission by consent of the instructor. Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

47-c. Principles of Education. Selected biological, psychological, sociological and statistical material will be treated in such way as to give the student not only a survey of the fundamental principles of education, but also a good basis for more intensive courses in education. Educational theory stressing the more important principles involved in the process of education especially in the secondary schools. Lectures, assigned readings and discussions. Prof. Bisbee.

Open to men and women who wish to become administrators or supervisors. Admission by consent of instructor. Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

48-b. Agriculture in the High School. This subject deals with special methods of teaching agriculture in the high school, with emphasis upon New Hampshire requirements as set up by the State Board of Education. The chief topics considered are: planning and equipping of classrooms and shops, selection of reference books, use and construction of charts and illustrative materials, the curriculum, the yearly plan of work; the presentation of materials of instruction through recitation, lab-

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oratory, field work and excursions; teaching through the home project, and supervised study. Mr. Farnum.

Lec. or rec., 3 hrs.; prep., 6 hrs.; 9 units.

52-a. Educational Problems. (Democracy in Education and Character Development.) This course will discuss student participation in high school control; social functions, their nature, supervision, time, and place. The underlying principles of club work, together with a discussion of organization and administration of typical clubs of senior high schools, will be given careful attention. The problem of character education and a discussion of the moral standards in our high schools as revealed by investigations will furnish the student with concrete evidence in this interesting field. Lectures, assigned readings, problems, and problems of research. Prof. Wellman and Prof. Bisbee.

Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

53-b. Educational Problems. (Educational and Vocational Guidance.) This course endeavors to make clear the problems with which the school counselor, the employment manager, and the intelligent individual himself have to deal. It discusses the beginnings of the guidance, pseudo-guidance, counselors' work in junior and senior high schools, and shows the intelligent student how he may guide himself, the methods of securing a position and obtaining advancement. Lectures, assigned readings, projects, problems, case studies with special reports. Prof. Wellman and Prof. Bisbee.

Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

54-c. Educational Problems. (The Psychology of Management.) This course is designed to help those who are concerned with administration and supervision, whether in the teaching profession or in any business occupation, to establish and maintain that human efficiency which results from high group morale. There will be a discussion of teacher participation through advisory council, shop committee plans, and other means of promoting democracy in the field of management. Three tenths of the time of this course will be devoted to the consideration of the psychology of camp leadership and special

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lectures will be introduced through the coöperation of the college Y. M. C. A. and Y. W. C. A. The camp leadership section will be open to all students and will carry three time units credit. Projects, problems, topical reports and discussions. Prof. Wellman.

Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

55-a, 56-b, 57-c. Special Problems in Educational Psychology. In this course an opportunity is afforded for intensive experimental and statistical work in Educational Psychology. Special problems may be carried over two or more terms.

101-a, 102-b, 103-c. Research in Administration and Supervision. To be arranged.

37-a. Experimental Psychology. Simple experiments on the sensations. Emphasis will be given toward the development of the proper technique of psychological investigation.

Lec. and lab., 6 hrs.; prep., 4 hrs.; 10 units.

38-b. Experimental Psychology. Experiments on the complex mental processes involving perception, association, imagination, learning and reaction time.

Lec. and lab., 6 hrs.; prep., 4 hrs.; 10 units.

39-c. Experimental Psychology. Psychophysical measurements, the determination of Weber constants, Limens of sensibility, etc.

Lec. and lab., 6 hrs.; prep., 4 hrs.; 10 units.

47-a. Physiological Psychology. A study of the physical basis of mind, nerve functions and their correlations with mental processes.

Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

48-b. Comparative Psychology. A study of psycho-genesis or the development of "mind" beginning with the one-celled organisms.

Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

49-c. Abnormal Psychology. A study of abnormal phenomena such as disorders of perception, association, memory,

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judgment and personality. The psychoses and psychoneuroses will be considered and a brief review of mental deficiency presented. Visits to institutions.

Lec. or rec., 3 hrs.; prep., 7 hrs.; 10 units.

51-a, 52-b, 53-c. Seminar. **Special Problems in Psychology.** Credit to be arranged.

104-a, 105-b, 106-c. **Research in Psychology.** Problems of either an experimental or theoretical nature may be pursued. Credit to be arranged.

ENGLISH

ALFRED E. RICHARDS, *Professor*

HAROLD H. SCUDDER, *Professor*

WILLIAM G. HENNESSY, *Associate Professor*

CLAUDE T. LLOYD, *Associate Professor*

The candidate for an advanced degree who selects English as his major subject must have a reading knowledge of French and German, or of Latin and German.

SUBJECTS FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

20-a, -b. **History of Seventeenth Century English Literature.** A survey of prose and poetry (exclusive of the drama) from 1600 to 1700.

Lec. or rec., 3 hrs.; prep., 6 hrs.; 9 units. No credit is given for only one term's work.

20.5-a, -b. **Milton.** A detailed study of Milton's minor poetry and *Paradise Lost*. Consideration is also given to the social, political and religious history of Milton's day as reflected in his life and poetry. (Not given in 1930-31.)

Lec. or rec., 3 hrs.; prep., 6 hrs.; 9 units. No credit is given for only one term's work.

22-b. **The English Novel in the Nineteenth Century.** A study of the novel from Jane Austen to Thomas Hardy. There

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will be lectures, recitations, and constant outside reading. (Not given in 1930-31.)

Lec. or rec., 3 hrs.; prep., 8 hrs.; 11 units.

26.5-a. The English Romantic Poets. This course is designed to cover the so-called romantic movement in English poetry. The causes and characteristics of the movement will be studied while special attention is being given to the poetry of Wordsworth, Coleridge, Scott, Byron, Shelley and Keats.

Lec. or rec., 3 hrs.; prep., 6 hrs.; 9 units.

27-a, 28-b, 29-c. Shakespeare's Plays. A study of the principal plays of Shakespeare. A large amount of reading required.

Lec. or rec., 3 hrs.; prep., 6 hrs.; 9 units.

29-b. The American Novel. A survey of the novel in America from Charles Brockden Brown to the present time. There will be lectures and constant outside reading.

Lec. or rec., 3 hrs.; prep., 8 hrs.; 11 units.

48-b. Contemporary Drama. Modern British and Continental drama from Ibsen to the present. Theories, types and developments.

Lec. or rec., 3 hrs.; prep., 6 hrs.; 9 units.

85-a, 86-b, 87-c. The English Language. The history and development of the English language from Middle English to that of today.

Lec. or rec., 3 hrs.; prep., 6 hrs.; 9 units.

SUBJECTS PRIMARILY FOR GRADUATE STUDENTS

101-a, 102-b, 103-c. Collateral Reading. The reading and discussing of selected masterpieces from the literature of the world. A term paper required of each student.

Lec. or rec., 3 hrs.; prep., 9 hrs.; 12 units.

104-a, 105-b, 106-c. Chaucer. An intensive study of Chaucer's *Canterbury Tales*, supplemented by readings from his

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minor poems. A reading knowledge of Old English or of Middle English is required. (Not given in 1930-31.)

Lec. or rec., 3 hrs.; prep., 9 hrs.; 12 units.

107-a, 108-b, 109-c. Beowulf. A study of the epic as representative of Old English language and literature.

Lec. or rec., 3 hrs.; prep., 9 hrs.; 12 units.

ENTOMOLOGY

W. C. O'KANE, *Professor*

P. R. LOWRY, *Assistant Professor*

The aim of graduate study in this department is to prepare a student for professional work in one or more of the several specialized divisions of Economic Entomology. Such preparation requires more time and effort than that represented by the four years of undergraduate college work. It assumes that in his undergraduate studies the student has laid a groundwork of general entomology and appropriate related sciences.

The student who wishes to enter graduate work will be expected to present such a foundation, its details depending on the phase of professional entomology in which the student desires to specialize. Related sciences presented may include subjects in zoölogy, chemistry, botany, plant pathology, bacteriology, horticulture, or physics, in various combinations. Consultation with the head of the Department of Entomology will determine the prerequisites necessary in a given case.

SUBJECTS FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

Under suitable circumstances graduate credit may be obtained for the following subjects, which are open also to undergraduates, provided the permission of the head of the Department of Entomology is secured, and provided that the graduate student completes additional work in these subjects and attains superior grades.

2-a. **Insects of Orchard and Garden.** The application of methods of insect control to typical injurious species. Studies

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in the life histories and habits of important insect pests of orchard, garden and certain field crops.

Prerequisite: Entomology 1-a. Lec., 2 hrs.; lab., 2½ hrs.; prep., 3 hrs.; 7½ units. Given in alternate years beginning with 1930-31.

3-b. Insects of Domestic Animals. The insect enemies of domestic livestock; the life histories, habits and means of control.

Prerequisite: Entomology 1-a. Lec., 2 hrs.; lab., 2½ hrs.; prep., 3 hrs.; 7½ units. Given in alternate years beginning 1929-30.

4-c. Household Insects. Medical Entomology. The life histories, habits and means of control of insects of the household and of stored products. The relation of insects to disease.

Lec., 2 hrs.; lab., 2½ hrs.; prep., 3 hrs.; 7½ units.

5-a, 6-b, 7-c. Advanced Economic Entomology. Detailed studies of subjects involved in applied entomology. The literature of economic entomology. Investigational practice. Original studies in the life history and habits of injurious species. Adapted for advanced students.

Required of students specializing in Entomology.
Hours and units to be arranged.

8-a, 9-b, 10-c. Advanced Economic Entomology. Continuation of Entomology 5-a, 6-b, 7-c for students who are specializing in the subject.

Required of students specializing in Entomology.
Hours and units to be arranged.

13-c. Forest Insects. Studies in the life histories and habits of the more destructive forest insects and the means of their control.

Prerequisite: Entomology 1-a. Elective for others.
Lec., 2 hrs.; lab., 2½ hrs.; prep., 3 hrs.; 7½ units.

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SUBJECTS PRIMARILY FOR GRADUATE STUDENTS

The following subjects represent a sequence of studies arranged to include such branches as insect anatomy, insect physiology, details of taxonomy, insect behavior, insect ecology, problems in dispersion, the organization of research, the organization of regulatory measures, and other phases involved in professional entomology. The sequence includes, also, the planning and prosecution of a problem in research, with presentation of the results in the form of a thesis.

14-a, 15-b, 16-c. Graduate Entomology.

Prerequisites: Entomology 5-a to 7-c, or the equivalent. Units and hours to be arranged.

17-a, 18-b, 19-c. Graduate Entomology.

Prerequisite: Entomology 5-a to 7-c, or the equivalent. Units and hours to be arranged.

HISTORY

DONALD C. BABCOCK, *Professor*

ARTHUR W. JONES, *Assistant Professor*

ALLAN B. PARTRIDGE, *Assistant Professor*

PHILIP M. MARSTON, *Assistant Professor*

WILLIAM YALE, *Instructor*

Admission to Graduate Study.

1. The completion of 90 time units, or the equivalent thereof, in history, exclusive of History 1-a, 2-b, 3-c, and with an average grade of 75 or better.

2. The understanding that the earning of graduate credit implies

- (a) A "passing grade" of 85 in courses taken in the same class with undergraduates.
- (b) A "passing grade" of 80 in other courses.
- (c) An additional 20% of work to be done as an extra assignment in classes with undergraduates.
- (d) A willingness and a desire to do more than the required minimum, especially as regards collateral reading.

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Admission to Candidacy.

1. Reading knowledge of a foreign language.
2. A comprehensive examination in the field of general history.
3. Favorable judgment of the head of the department as well as of the Dean of the Graduate School.

Objectives: In general, two classes of graduate students may find it profitable to do their major work in this department. The first consists of students who desire a more extended knowledge and a more complete historical background to round out a liberal education, and perhaps to prepare them for the teaching of history. The second consists of those who wish to specialize on some phase of New England history, preferably that of New Hampshire.

Plan of Work: General Course. All graduate students in this department will include in their programs, at an early date, course 1-g, Historic Survey. At some later period they will include 2-g and 3-g, Historic Reading and Theory. They will also enroll for some part of the year's work indicated by the courses 10-g, 11-g, 12-g, Thesis. Those not specializing in New England History will complete their major work from courses listed in the general catalog.

Special Course. Students specializing in the history of New England will be expected to choose as a subject for the thesis some topic within this field. For this purpose the available facilities for research are considerable, including the libraries of this and other universities, the State Library and the Library of the Historical Society in Concord, and various town records, private documents, unrecorded personal memoirs, landmarks, etc. A part of the work of this department is conceived to be the discovery and conservation of source material existing in the material and mental accumulations of the older type of New England population.

Courses 4-g-9-g inclusive are designed for students of New England history. These courses are not given in class work.

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SUBJECTS RESTRICTED TO GRADUATE STUDENTS

- 1-g. Historic Survey.
- 2-g, 3-g. Historic Reading and Theory.
- 4-g, 5-g, 6-g. New England History.
- 7-g, 8-g, 9-g. New Hampshire History.
- 10-g, 11-g, 12-g. Thesis.

HORTICULTURE

GEORGE F. POTTER, *Professor*

J. RAYMOND HEPLER, *Assistant Professor*

L. PHELPS LATIMER, *Assistant Professor*

Graduate work in Horticulture is offered to students who desire training for professional work, and who have fulfilled the requirements for undergraduate students majoring in Horticulture at this or a similar institution. A reading knowledge of French and German is desirable. The student should also have had sufficient practical experience to enable him to understand and appreciate the problems of Horticulture.

Students will find the department well equipped for fundamental research on horticultural problems.

SUBJECTS FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

5-a. Systematic Survey of Fruits and Vegetables. A study of the more important species of fruits and vegetables and their botanical relationships.

Lec., 2 hrs.; prep., 3 hrs.; 5 units.

6-b. Advanced Pomology. A detailed study of fundamental principles and experimental data and their application and relation to orchard problems such as growth and rest period in fruit plants, water requirements, soil management, pruning, fruit bud formation, fruit setting, pollination, thinning, winter injury, and the quality and keeping period of fruits in storage.

Lec., 3 hrs.; prep., 5 hrs.; 8 units.

10-b. Evolution and Improvement of Plants. The application of the principles of genetics to agricultural plant breeding.

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Hybridization and selection are studied as means of improving horticultural varieties of plants. It is preferably preceded by genetics (Zoölogy 32-a).

Lec., 2 hrs.; prep., 3 hrs.; 5 units. Given in alternate years beginning 1927-28.

12-a, 12.5-b. Horticultural Seminar. A review of the recent horticultural literature and methods of investigational work.

Lec., 2 hrs.; prep., 2 hrs.; 4 units.

SUBJECTS PRIMARILY FOR GRADUATE STUDENTS

101-b. Problems in Flower Bud Formation. A discussion of scientific and experimental evidence bearing on flower formation, growth, and composition of fruit plants, alternate bearing of apples, and soil management and fertilization of orchards.

Lec., 3 hrs.; prep., 9 hrs.; 12 units.

102-b. Methods of Horticultural Research. An examination of methods used in laboratory and field by horticultural investigators.

Lec., 2 hrs.; prep., 4 hrs.; 6 units.

103-a. Problems in Winter Injury. A continuation of Horticulture 101-b, dealing with the subject of winter injury to fruit plants.

Lec., 2 hrs.; prep., 6 hrs.; 8 units.

104-b. Physiological Problems in Propagation and Growth. A continuation of Horticulture 103-a, dealing with the problems of water relations, rest period, propagation, pruning and thinning of orchard fruits.

Lec., 3 hrs.; prep., 9 hrs.; 12 units.

105-c. Problems in Pollination and Fruit Storage. A continuation of Horticulture 104-b, dealing with pollination, fruit setting, color development, and storage of fruits.

Lec., 2 hrs.; prep., 6 hrs.; 8 units.

106-a. Problems in Vegetable Production. A critical study of the physiological problems involved in vegetable production.

Lec., 3 hrs.; prep., 9 hrs.; 12 units.

125-a. Research in Horticulture. Units to be arranged.

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LANGUAGES

J. HERBERT MARCEAU, *Associate Professor*
JOHN STEPHEN WALSH, *Associate Professor*
PAUL P. GRIGAUT, *Assistant Professor*
JOHN A. FLOYD, *Instructor*

To pursue graduate work in French, an applicant, if a graduate of the University of New Hampshire, must have majored in French, and must have demonstrated his fitness for work in the graduate courses offered by this department. If a graduate of another institution, an applicant must show by his record and by his ability to write and speak French that he is prepared to undertake the work.

SUBJECTS FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

FRENCH

10-a, 11-b, 12-c. French Drama. The rise and development of the drama in France with reading and study of plays indicative of the various tendencies from Corneille to the present.

Prerequisite: French 9-c. Rec., 3 hrs.; 10 units.

16-a, 17-b, 18-c. Romanticism and Realism in French Literature of the Nineteenth Century. Prose and poetry of the more important writers with lectures and outside reading.

Prerequisite: French 12-c. Rec., 3 hrs.; 10 units.

19-a, 20-b, 21-c. Recent Tendencies in French Literature. Studies of the tendencies in French literature of the later nineteenth century and the beginning of the twentieth century. This subject is open to a limited number of qualified undergraduates and to graduate students. Permission of the instructor is required before enrollment.

Lec. or rec., 3 hrs.; 12 units.

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22-a. Review Course for Teachers. Study of and practice in the presentation and arrangement of secondary school work in French.

Rec., 3 hrs. 10 units.

40-a, 41-b, 42-c. Lecture Course in French. On French literature, history, art, and civilization with quizzes, written and oral.

Lec., 3 hrs. 10 units.

SUBJECTS FOR GRADUATE STUDENTS ONLY

101-a, 102-b, 103-c. French Literature of the 16th Century. The course will cover the study of the works of Marot, Ronsard et la Pleiade, Calvin, Rabelais, Montaigne, and others.

Lec. or rec., 3 hrs.; 12 units.

107-a, 108-b, 109-c. Foreign Influences on French Literature. The study of the influences of other countries upon French literature particularly during the 18th, 19th and 20th centuries.

Lec. or rec., 3 hrs.; 12 units.

LATIN

The following courses, sufficient to satisfy minor requirements for students approved by the department will be offered in 1930-31.

10-a, 11-b, 12-c. A Comprehensive View of the Latin Literature of the Golden Age.

The works of Cæsar, Cicero and Virgil will be studied for their literary and historic value.

The history of Rome during the golden age will be studied in order to provide the background necessary to the student or teacher of the classics.

3 hrs.; 10 units.

13-a, 14-b, 15-c.

Translation of English prose and poetry beginning with the fundamentals of composition and progressing to a study of prose style and effective idiomatic expression.

3 hrs.; 10 units.

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MATHEMATICS

HERMON L. SLOBIN, *Professor*

WALTER E. WILBUR, *Assistant Professor*

MARVIN R. SOLT, *Assistant Professor*

EDWARD H. WELLS, *Assistant Professor*

BRADFORD F. KIMBALL, *Assistant Professor*

SUBJECTS FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

10-a, 11-b, 12-c. Differential Equations and Applications to Engineering Problems. Prof. Slobin.

Prerequisite: Mathematics 9. Rec., 3 hrs.; 9 units.

14-b, 15-c. The History of Mathematics. This course is designed especially for those preparing to teach mathematics in the high schools. It aims to give an historical background and an appreciation of the development of various fields of mathematics. Prof. Wells.

Prerequisite: Mathematics 9. Rec., 3 hrs.; 7½ units.

16-a, 17-b, 18-c. Secondary School Mathematics. A study of the content and the method of teaching secondary school mathematics. Prof. Wilbur.

Prerequisite: Mathematics 203; or 1, 2 and 3. This course carries graduate credit only for students whose major is Education. Rec., 3 hrs.; 7½ units.

30-a, 31-b, 32-c. Advanced Plane and Solid Analytical Geometry. Prof. Solt.

Prerequisite: Mathematics 9. Rec., 3 hrs.; 7½ units.

SUBJECTS PRIMARILY FOR GRADUATE STUDENTS

50-a, 51-b, 52-c. Sequences and Series. An introduction to advanced analysis. Prof. Slobin.

Prerequisite: Mathematics 9. Rec., 3 hrs.; 9 units.

60-a, 61-b, 62-c. Selected Topics in the Theory of Functions of a Real Variable. Prof. Kimball.

Prerequisite: Mathematics 9. Rec., 3 hrs.; 9 units.

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70-a, 71-b, 72-c. Selected Topics in the Theory of Functions of a Complex Variable. Prof. Kimball.

Prerequisite: Mathematics 9. Rec., 3 hrs.; 9 units.

80-a, 81-b, 82-c. Advanced Algebra. The following topics will be treated in this course: matrix theory, including elementary divisors and invariant factors; linear transformations; quadratic, bilinear, and Hermitian forms; invariants and covariants with geometric applications; and topics from the theory of equations, including symmetric functions, and groups of substitutions. Prof. Wells.

Prerequisite: Mathematics 9. Rec., 3 hrs.; 9 units.

POULTRY HUSBANDRY

T. BURR CHARLES, *Professor*

CARL L. MARTIN, *Assistant Professor*

HOMER O. STUART, *Instructor*

CHARLES BOTTORFF, *Instructor*

A student desiring to take graduate work in Poultry Husbandry should offer as a prerequisite an undergraduate training in this field. He should also have sufficient practical experience to enable him to understand and appreciate the problems of poultry keeping.

SUBJECTS FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

100-a, 101-b, 102-c. Poultry Diseases. An advanced course treating on etiology, treatment, prevention and dissemination of specific poultry diseases. Prerequisites: Poultry Husbandry 6-b or equivalent and a course in general bacteriology.

Lec. or rec., 3 hrs; lab. 4 hrs.; prep, 3 hrs.; 10 units.

103-a, 104-b, 105-c. Poultry Breeding. The application of the principles of genetics to poultry breeding; hybrid crosses; sex-linkage as affecting the commercial poultrysmen. Prerequisites: Poultry Husbandry 10-a, 23-b or their equivalents. It is preferably preceded by genetics. (Zoölogy 32-a).

Lec. or rec., 3 hrs; lab. 4 hrs.; prep, 3 hrs.; 10 units.

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106-a, 107-b, 108-c. Poultry Nutrition. A subject treating on the effects of food constituents and the laws and principles governing nutrient requirements. Prerequisites: 9-c and Physiological Chemistry 4-b.

Lec. or rec., 3 hrs; lab. 4 hrs.; prep, 3 hrs.; 10 units.

109-a, 110-b, 111-c. Special Problems. Incubation, brooding, battery brooding, management, breeding, marketing, nutrition, diseases, etc. By special permission. Units to be arranged.

112-a, 113-b, 114-c. Poultry Seminar. 3 units each.

SOCIOLOGY

ALBERT N. FRENCH, Professor

HANNIBAL G. DUNCAN, Associate Professor

Prerequisites for majoring in Sociology include Group A subjects, including principles of sociology, etc. (See undergraduate catalog).

For majoring 100 time units are required in Sociology and closely related minor fields, in addition to the 50 units which may be given for a thesis, which thesis must be jointly approved by the department head and the Dean of the Graduate School. In addition to the basic work outlined below, combinations may be arranged with (1) Philosophy and Psychology, (2) Social Science, inclusive of History, (3) Zoölogy, (4) English, (5) Education, (6) Statistics, understanding that special approval of the Dean of the Graduate School is necessary to combine offerings in more than two of the above fields.

Social Psychology and Social Theory

17-a. Social Psychology. An analytic study of human mechanisms, reflexes, traits, etc., basic to an expanding personality. (In addition to the work of the undergraduate course, foundation reading in Endocrinology or Zoölogy will be required). 9 units.

18-b. Societal Psychology. A further analytic study of social psychology in terms of social dynamics, social philosophy, etc. (The work of the undergraduate class will be supplemented by

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systematically directed research, based on methods adequately developed in the graduate seminar or related courses). 9 units.

19-c. Social Dynamics. A synthetic study of the principles of social change, conflict and re-education, in the light of recent research in philosophy, biology, psychology, and closely related social sciences. (In addition to undergraduate work in Social Dynamics and Social Emergence (22-c), readings in contemporary sociology will be required.). 9 units.

Population Problems

23-a. Man and Culture (Anthropology). It is the purpose of this course to treat the characteristics of pre-historic races and their culture, together with the criteria used in distinguishing various human races and stages of culture; to study specifically the psychological and sociological implications involved in rites, beliefs, and other cultural acquisitions of man. (Not given in 1930). 6 units.

24-b. Race and Population Problems. This course consists of theories and policies of population; the increase of numbers; the problems of quality as affected by the differential birth rate, migrations, and racial mixtures; the sociological effects of cultural diffusion; and the control of population increase. 6 units.

25-c. Immigration and Assimilation. This course deals with immigrant backgrounds, immigrants, their children and grandchildren. It traces the natural process of assimilation, showing the conflicts and adjustments peculiar to each generation. 6 units.

Social Research

26-a. Social Research. A general study of the problem of method in social science research, inclusive of instruction in gathering data and its evaluation in typical social problems. (Students taking this subject should also enroll for the Seminar 30-a.) 9 units. (Given as Seminar 30-a in 1930.)

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27-b. Criminology. An analysis of five hundred criminal careers, utilizing the case study and scientific-human methods. (Students taking this subject should also enroll for 31-b.) Prerequisite, 26-a. 9 units.

29.5-c. Social Work. A survey of social work as related to sociology. (Offerings in Social Emergence 22-c and Social Dynamics 19-c are recommended.) (Students taking this subject should also enroll for 32-c.) 6 units.

30-a, 31-b, 32-c. Seminar: Sociological Research. An advanced study of problems common to social research.

- I. Population Problems, Professor Duncan.
 - II. Social Theory, Professor French.
 - III. Psycho-social Research, Professor French.
- Credit to be arranged.

33-c. Seminar: Professional Research. Methods for teaching social science in high school and college. Credit to be arranged.

Thesis

34-a, b, c. Thesis. Research incident to an approved thesis topic. Credit to be arranged.

ZOOLOGY

- C. F. JACKSON, *Professor*
- A. D. JACKSON, *Associate Professor*
- E. T. RICHARDSON, *Assistant Professor*
- D. G. BARTON, *Instructor*

The special requirements for graduate work in Zoölogy include a thorough foundation in the principles of zoölogy, and the equivalent of 150 units in this and allied sciences.

SUBJECTS FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

36-a, 37-b, 38-c. Histology.

Lec. or rec., 2 hrs.; lab., 6 hrs.; prep., 4 hrs.; 12 units.

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39-a, 40-b, 41-c. Embryology.

Lec. or rec., 3 hrs.; lab., 4 hrs.; prep., 5 hrs.; 12 units.

42-a, 43-b, 44-c. Advanced Physiology.

Lec. or rec., 3 hrs.; lab., 4 hrs.; prep., 5 hrs.; 12 units.

48-a, 49-b, 50-c. Cytology and Genetics.

Lec. or rec., 3 hrs.; lab., 2½ hrs.; prep., 6½ hrs.; 12 units.

51-a, 52-b, 53-c. Advanced Neurology.

Lec. or rec., 3 hrs.; lab., 2½ hrs.; prep., 6½ hrs.; 12 units.

60-s. Invertebrate Morphology and Taxonomy.

Lec. or rec., 5 hrs.; lab., 5 hrs.; prep., 10 hrs.; 10 units.

61-s. Vertebrate Ecology.

Lec. or rec., 3 hrs.; lab., 4 hrs.; prep., 10 hrs.; 10 units.

62-s. Comparative Embryology.

Lec. or rec., 5 hrs.; lab., 5 hrs.; prep., 10 hrs.; 10 units.

63-s. Advanced Comparative Anatomy of Vertebrates.

Lec. or rec., 5 hrs.; lab., 5 hrs.; prep., 10 hrs.; 10 units.

SUBJECTS PRIMARILY FOR GRADUATE STUDENTS

80-a, 81-b, 82-c. Advanced Taxonomy. Critical examination of select groups of vertebrates and invertebrates with special reference to local forms, their classification, distribution, and phylogeny.

Prerequisites: Three years' work in Zoölogy. Lec. or rec., 2 hrs.; lab., 4 hrs.; prep., 4 hrs.; 10 units.

83-a, 84-b, 85-c. Advanced Comparative Morphology. A critical and detailed study of the structure and function of

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aberrant forms and a comparison with the types of the group to which they belong.

Prerequisites: Three years' work in Zoölogy. Lec. or rec., 2 hrs.; lab., 6 hrs.; prep., 2 hrs.; 10 units.

86-a, 87-b, 88-c. Advanced Vertebrate Ecology. A study of advanced ecological problems and their correlation with morphology, physiology, and taxonomy as exemplified by local associations and cenoses.

Rec. or lec., 2 hrs.; lab., 4 hrs.; prep., 4 hrs.; 10 units.

89-a, 90-b, 91-c. Experimental Genetics. Studies of the effect of hormones, introduced toxins, or drugs on the germ plasm or modification of the offspring when such drugs are given to the parent. The relation of chromosomes to inheritance will be considered experimentally.

Prerequisites: Three years' work in Zoölogy, including Genetics. Lec. or rec., 1 hr.; lab., 6 hrs.; prep., 3 hrs.; 10 units.

92-a, 93-b, 94-c. Comparative Embryology. A detailed study of the embryonic history of selected types of animals with special emphasis on basic embryological principles.

Prerequisites: Three years' work in Zoölogy, including Embryology. Lec. or rec., 3 hrs.; lab., 4 hrs.; prep., 3 hrs.; 10 units.

99a-b-c. Special Problems. Advanced students may elect this work provided they present a detailed outline of the problems which they wish to investigate and, furthermore, provided they can furnish adequate proof of their ability to carry the problem in view of their past training and the equipment available.

Prerequisite: By special permission. Units to be arranged.

GRADUATE STUDENTS

NAME	COURSE	P. O. ADDRESS
Abbott, Harold Elliott, B.S. New Hampshire, 1928	<i>Major-Chemistry</i> <i>Minor-Bio. Chem.</i>	<i>Lakeport</i>
Adams, John Henry, B.S. New Hampshire, 1930	<i>Major-Zoölogy</i> <i>Minor-Chemistry</i>	<i>Keene</i>
Allan, Philip Farley, B.S. New Hampshire, 1930	<i>Major-Zoölogy</i> <i>Minor Geology</i>	<i>West Lebanon</i>
Ames, Elizabeth H., A.B. Mount Holyoke, 1927	<i>Major-Zoölogy</i>	<i>Somersworth</i>
Bauer, Elizabeth Blum, B.A. New Hampshire, 1929	<i>Major-English</i> <i>Minor-German</i>	<i>Durham</i>
Bourque, Jos. Edward, B.S. New Hampshire, 1929	<i>Major-Zoölogy</i> <i>Minor-Chemistry</i>	<i>Somersworth</i>
Breck, Mary Elizabeth, B.S. New Hampshire, 1929	<i>Major-Education</i>	<i>Windsor, Vt.</i>
Brierley, Jean, 1930, B.S. New Hampshire	<i>Major-Zoölogy</i>	<i>Lawrence, Mass.</i>
Buckley, Bertha Ella, A.B. Mount Holyoke, 1929	<i>Major-Education</i>	<i>Berlin</i>
Colovos, Nicholas Filip New Hampshire, 1927	<i>Major-Bio. Chem.</i> <i>Minor-Dairy Hus.</i>	<i>Durham</i>
Daggett, Albert Fred'k, B.S. New Hampshire, 1928	<i>Major-Chemistry</i> <i>Minor-Mathematics</i>	<i>Concord</i>
Eastwood, Medora Viola, B.S. New Hampshire, 1927	<i>Major-Zoölogy</i> <i>Minor-Chemistry</i>	<i>Plymouth, Mass.</i>
Eaton, Frank Lewell, B.A. Oskaloosa College, 1925	<i>Major-Education</i>	<i>Wells, Me.</i>
Eddy, George Norman, Th.B. Gordon College, 1929	<i>Major-Sociology</i> <i>Minor-Psychology</i>	<i>Durham</i>
Eddy, Ruth Garland, Th.B. Gordon College, 1929	<i>Major-Sociology</i> <i>Minor-Psychology</i>	<i>Durham</i>

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Ekdahl, Hulda Elisab'h, B.A.	<i>Major-Education</i>	<i>Nashua</i>
Syracuse University, 1923	<i>Minor-History</i>	
Elliott, Charles Ned, B.A.	<i>Major-History</i>	<i>Contoocook</i>
New Hampshire, 1928	<i>Minor-Education</i>	
Fossett, Harlan M., B.S.	<i>Major-Education</i>	<i>Berlin</i>
Bates, 1915		
Fox, Robert Howard, B.A.	<i>Major-Entomology</i>	<i>Dayton, Ohio</i>
Ohio State, 1929	<i>Minor-Botany</i>	
Fraser, Margaret Mary, B.A.	<i>Major-Education</i>	<i>Berlin</i>
Univ. of Maine, 1926		
Fritz, James Clarence, B.S.	<i>Maj.-Ag. & Bio. Chem.</i>	<i>Berlin</i>
Penn State, 1929	<i>Minor-Zoölogy</i>	
Fuller, John McElroy, B.S.	<i>Major-Dairy Hus.</i>	<i>Durham</i>
Iowa State, 1911	<i>Minor-Economics</i>	
Fussell, Clyde Greenl'f, B.A.	<i>Major-Education</i>	<i>Whitefield</i>
Middlebury, 1925		
Garrett, Ransome Jos., B.S.	<i>Major-Education</i>	<i>Berlin</i>
Bates College, 1920		
Geremonty, F. Howard, B.S.	<i>Major-Political Sci.</i>	<i>Manchester</i>
New Hampshire, 1925	<i>Minor-History</i>	
Goodwin, Crystal Evelyn, B.S.	<i>Major-Psychology</i>	<i>Dover</i>
New Hampshire, 1929	<i>Minor-History</i>	
Googins, Robt. Wendell, B.A.	<i>Major-Education</i>	<i>Dover</i>
New Hampshire, 1929	<i>Minor-History</i>	
Gordon, Philip Augst'e, Th.B.	<i>Minor-Philosophy</i>	<i>Hampton</i>
Gordon College, 1928	<i>Minor-History</i>	
Gosbee, Matthew, Th.B.	<i>Major-Education</i>	<i>Cape Ned'ck, Me.</i>
Gordon College, 1929	<i>Minor-History</i>	
Guptill, Geo. Herbert, B.A.	<i>Major-Political Sci.</i>	<i>Raymond</i>
New Hampshire, 1928	<i>Minor-History</i>	
Hill, Bernice Mary, B.S.	<i>Major-Education</i>	<i>Ctr. Strafford</i>
New Hampshire, 1923		
Hoitt, Samuel Waldo, B.S.	<i>Major-Agr. Econ.</i>	<i>Durham</i>
New Hampshire, 1928	<i>Minor-Statistics</i>	

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Hounsell, Wm. Booth, B.A.	<i>Major-Education</i>	<i>Durham</i>
New Hampshire, 1930	<i>Minor-French</i>	
Howe, Martha Whittier, B.S.		<i>Portland, Me.</i>
New Hampshire, 1930		
Joyal, Raymond Joseph, B.A.	<i>Major-History</i>	<i>Somersworth</i>
New Hampshire, 1929	<i>Minor-Education</i>	
Krabek, Wilf'd Burleigh, B.S.	<i>Major-Chemistry</i>	<i>Dover</i>
New Hampshire, 1929	<i>Minor-Mathematics</i>	
Landelius, Conrad G. E., Th.B.	<i>Major-Sociology</i>	<i>Brooklyn, N. Y.</i>
Gordon College, 1928	<i>Minor-Phil. and Psychology and English</i>	
Lane, Walter Eben, B.A.	<i>Minor-Education</i>	<i>No. Berwick, Me.</i>
Bates College, 1912		
Lowry, Mrs. Doris G., B.S.	<i>Major-English</i>	<i>Durham</i>
Simmons College, 1923	<i>Minor-History</i>	
McKelvey, Isabelle W., B.A.	<i>Major-Education</i>	<i>Whitefield</i>
Wheaton College, 1921		
Martin, Josephine Ella, B.A.	<i>Major-Psychology</i>	<i>Hartland, Vt.</i>
New Hampshire, 1929	<i>Minor-Zoölogy</i>	
Moran, Phyllis M., B.A.	<i>Major-History</i>	<i>Somersworth</i>
New Hampshire, 1930		
Morrison, Leonard S., B.S.	<i>Major-Education</i>	<i>Whitefield</i>
New Hampshire, 1910		
Murphy, Anna Dorothy, B.A.	<i>Major-French</i>	<i>Springfield, Vt.</i>
Boston University, 1929	<i>Minor-English</i>	
Murphy, Frederic C., B.A.	<i>Major-Education</i>	<i>Berlin</i>
Univ. of Maine, 1928		
Murray, Harry Lee, B.S.	<i>Major-Botany</i>	<i>Hamp. Hlds., Me.</i>
Univ. of Maine, 1929		
Nulsen, William B., B.S.	<i>Major-Mathematics</i>	<i>Durham</i>
Calif. Inst. of Tech., 1918	<i>Minor-E. E.</i>	

GRADUATE SCHOOL

Nye, Gertrude E., B.A. New Hampshire, 1929	<i>Major-English Minor-French</i>	Westville
O'Hara, James Leo, B.A. Bates College, 1925	<i>Major-Education</i>	Berlin
Parkinson, Everton H., B.A. Wesleyan, 1926	<i>Major-Education</i>	Whitefield
Pease, Perley Henry, B.S. New Hampshire, 1926	<i>Major-Education</i>	Meredith
Pickett, Thomas Austin, B.S. Mass. Agr. College, 1928	<i>Maj.-Agr. & Bio. Chem. Minor-Chemistry</i>	Beverly, Mass.
Putnam, Shirley G., B.A. New Hampshire, 1929	<i>Major-English Minor-Education</i>	Portland, Me.
Rasmussen, E. J., B.S., M.S. Univ. of Wisconsin, 1927	<i>Major-Horticulture Minor-Botany</i>	Durham
Redden, Elizabeth A., B.A. New Hampshire, 1928	<i>Major-Sociology Minor-Education</i>	Dover
Richard, Heloise Elsie, B.A. New Hampshire, 1930	<i>Major-French</i>	Dover
Rienert, Carl Stig, B.A. Upsold College, 1925	<i>Major-Education</i>	Berlin
Rosenthal, Edward I., B.S. New Hampshire, 1929	<i>Major-Zoölogy Minor-Chemistry</i>	Manchester
Scott, R. Beatrice, B.A. Wellesley College, 1913	<i>Major-English Minor-Education</i>	Wolfeboro
Sewell, Charles Arthur, B.S. New Hampshire, 1929	<i>Major-Mathematics Minor-Education</i>	Dover
Sheehan, Eleanor Lucey, B.S. New Hampshire, 1930	<i>Major-Zoölogy Minor-Physio. Chem.</i>	Portsmouth
Sheehan, John Frances, B.S. New Hampshire, 1928	<i>Major-Zoölogy Minor-Education</i>	Portsmouth
Smith, Charlotte Marie, B.S. New Hampshire, 1927	<i>Major-Zoölogy</i>	Dover
Stark, Lewis Morgrage, B.A. New Hampshire, 1929	<i>Major-English Minor-History</i>	Goffstown

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Swain, Howard Eugene, B.S.	<i>Major-Education</i>	<i>Exeter</i>
New Hampshire, 1916		
Tepper, Albert Edward, B.S.	<i>Major Poultry Hus.</i>	<i>Ridley Pk., Pa.</i>
Penn State, 1928	<i>Minor-Agri. Econom.</i>	
Thompson, Ruth Eliza, B.S.	<i>Major-Zoölogy</i>	<i>Nashua</i>
New Hampshire, 1929	<i>Minor-Botany</i>	
Tyler, Kenneth E., B.S.	<i>Major-Education</i>	<i>Hampton</i>
Tufts, 1922		
Vachon, Edmond Jos., B.A.	<i>Major-French</i>	<i>Dover</i>
New Hampshire, 1930	<i>Minor-Education</i>	
Walker, Carl Ernest, B.S.	<i>Major-Forestry</i>	<i>Contoocook</i>
New Hampshire, 1929	<i>Minor-Botany</i>	
Watson, Alice Louise, B.S.	<i>Major-Agric. Chem.</i>	<i>Durham</i>
New Hampshire, 1928	<i>Minor-Education</i>	
Webster, Robt. Gordon, B.A.	<i>Major-English</i>	<i>Durham</i>
New Hampshire, 1926	<i>Minor-History</i>	
Wellman, Blanche W., B.A.	<i>Major-Education</i>	<i>Durham</i>
Colby College, 1898		
N. H., M. A., 1928		
Weston, Helen Brown, B.S.	<i>Major-Education</i>	<i>Whitefield</i>
New Hampshire, 1917		
Woodman, Louise S., B.S.	<i>Major-Mathematics</i>	<i>Milton Mills</i>
New Hampshire, 1929	<i>Minor-Education</i>	
Wright, Murray J., B.A.	<i>Major-Education</i>	<i>Alton</i>
Dartmouth, 1926		
Yeaton, Rose Dearborn, B.S.	<i>Major-Mathematics</i>	<i>Tilton</i>
New Hampshire, 1930		

